

EEL 6764 001: Graduate Computer Architecture

Spring 2025

Instructor: Dr. Srinivas Katkoori

Homework 2

Memory Hierarchy

Assigned on Monday, 10th February.

DUE: 11:59:59PM, Monday, 24th February via Canvas

Upload your solutions in PDF format.

No late work will be accepted.

For some questions, we refer to the exercise problems in the H&P textbook (6th edition).

If certain information is not provided, make reasonable assumptions of your own, and use those assumptions to approach the solutions. Make sure that in your solutions, state your assumptions clearly.

- 1) (6 pts) Briefly (in 2-3 sentences each) describe six basic cache optimization techniques.
- 2) (8 pts) Briefly (in 2-3 sentences each) describe eight advanced cache optimization techniques.
- 3) (10 pts) Effect of Locality – Solve problem B.1 on page B-60.
- 4) (10 pts) Fully Associative and 4-way Associative Cache – Solve problem B.2 on page B-60.
- 5) (10 pts) Cache Performance: Solve problem B.5 on page B-63.
- 6) (10 pts) Small vs. Large Cache Size: Solve problem B.12 on page B-65.
- 7) (10 pts) TLB hit/miss: Solve B.13 on page B-65.
- 8) (10 pts) Way Predicting Cache: Solve problem 2.18 on page 156.
- 9) (10 pts) Critical Word First and Early Restart: Solve problem 2.20 on page 157.
- 10) (10 pts) Multi-level Caches: Solve problem 2.22 on page 157.
- 11) (6 pts) Merging Write Buffer: Solve problem 2.21 on page 157.